Laparoscopic management of large paraesophageal hiatal hernia

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Abstract

Background: Large paraesophageal hernias (POHs) predominantly occur in the elderly population. Early repair is recommended to avoid the risks associated with gastric volvulus.

Methods: Data were collected prospectively during an 8-year period. Laparoscopic repair of POHs initially included circumcision of the sac and mesh hiatal repair. Sac excision and suture hiatal repair were later adopted. A fundoplication was also included, initially as a selective procedure.

Results: Fifty-three patients with large POHs were treated by one surgeon. All had attempted laparoscopic repair, with four conversions to an open procedure. Symptomatic hernia recurrence occurred in five patients (9%). The 21 patients who had sac excision, hiatal repair, and fundoplication have remained free of symptomatic recurrence. The postoperative morbidity rate was 13%, with one death.

Conclusions: Laparoscopic repair of large POHs remains feasible. We advocate complete sac excision, hiatal repair, fundoplication, and gastropexy to prevent early recurrence.

Key words: Laparoscopy — Paraesophageal hiatal hernia — Laparoscopic procedure — Fundoplication

Laparoscopic repair of sliding hiatal hernia is a well-established procedure with a proven record of efficacy and safety. Paraesophageal hernias (POHs) are relatively rare, accounting for less than 5% of all hiatal hernias [7]. The condition occurs principally in the elderly and presents with obstructive symptoms rather than those of gastroesophageal reflux. If left untreated, patients may present acutely with gastric volvulus, strangulation, or gastrointestinal hemorrhage. The associated high mortality of these complications has led to the recommendation of early elective repair once a diagnosis has been made [12].

Traditionally, POHs have been repaired by transthoracic [12] or transabdominal [7] approaches. Dedicated centers have reported success with a laparoscopic approach to POH repair [2, 4, 6, 11, 13]. Laparoscopic repair offers advantages of reduced postoperative pain, fewer overall complications, shorter hospital stay, and rapid convalescence compared to open repair [14]. Laparoscopic POH repair is technically challenging, requiring advanced laparoscopic skills. Debate persists concerning whether to excise the hernia sac, how to close the crural defect, and whether to perform an antireflux procedure.

Materials and methods

Between January 1994 and January 2002, 53 patients (female:male ratio 2.5:1) with a mean age of 71 years (range, 45–92) underwent attempted laparoscopic repair of POH. Data were collected prospectively on a handheld computer database (Psion, London, UK).

At the time of admission, patients had symptoms for a mean of 53 months (range, 1–360). Obstructive symptoms were noted in 41 patients, principally postprandial fullness with early satiety. Other symptoms included intermittent regurgitation, vomiting, and epigastric pain. Fourteen patients were found to have iron-deficiency anemia (hemoglobin less than 10 g/dl). Eleven patients presented with episodes of acute upper gastrointestinal hemorrhage (Table 1).

All patients were assessed preoperatively by esophagogastroduodenoscopy and barium meal studies. Esophageal manometry and pH studies were attempted in the initial 14 patients. pH studies were subsequently abandoned because anatomical distortion led to significant interpretive inaccuracies and the results failed to provide information that altered patient management.

Standardized operative and postoperative details were recorded. Patient outcome was assessed by use of a verbal questionnaire and modified Visick grading. All patients were interviewed by telephone between six and 89 months postoperatively using the standardized questionnaire. Patients were asked how long after operation they returned to work or normal domestic activities and to score their level of satisfaction with the procedure. Outcome failures were recurrence of preoperative symptoms or barium meal recurrence, the need for reoperation, or death. Patients with recurrent or persistent symptoms after operation underwent repeat barium studies to confirm or refute hernia recurrence.

Operations were performed in the reverse Trendelenberg position with the operator standing between the patients' legs. Five 11-mm ports were used, except for those undergoing mesh repair, in whom the left subcostal port was 12 mm in diameter. A 30° oblique viewing telescope was used.

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Table 1. Preoperative characteristics and symptoms of patients undergoing laparoscopic surgery for paraesophageal hernia

	Group M (n = 14)	Group S (n = 37)	Group G (n = 2)
Age (yr)[a]	72 (61–85)	71 (45–92)	71, 74
Sex (M:F)	3:11	11:26	1:1
Length of symptoms (months)[a]	46 (1–240)	57 (0.5–360)	20–26
Obstructive symptoms	13 (93%)	27 (73%)	1 (50%)
Reflux symptoms	3 (21%)	20 (54%)	0
Preoperative esophagitis	2 (14%)	7 (19%)	0
Anemia/UGIH	3/3 (21/21%)	11/8 (30/22%)	0/0
ASA I/II/III/IV	4/7/3/0	6/18/12/1	0/2/0/0

Group M, mesh repair; group S, sutured repair; group G, gastropexy alone; PPI, proton pump inhibitor; ASA, American Society of Anesthesiologists; UGIH, upper gastrointestinal hemorrhage
[a] Mean value (range)

The herniated stomach was reduced into the abdomen by "walking" with two pairs of atraumatic tissue forceps and was held in the reduced position with a pair of endo-Babcocks. Adhesions between the stomach and sac were divided with endo-scissors. The peritoneum over the right hiatal pillar was divided to expose the crural muscle fibers. Our initial policy was to leave the hernial sac in situ, having "circumcised" it from the diaphragm to allow adequate crural repair. Since 1998, we have adopted complete sac excision.

The hiatal defect was repaired using one of two distinct methods. Initially, stapled mesh was used (group M). In 14 patients a polypropylene hernia mesh (Ethicon, Edinburgh, UK) was cut into the shape of the "Arc de Triomphe." The mesh was introduced into the abdominal cavity and positioned over the hiatus anteriorly to allow free passage of the esophagus through the Arc. The mesh was then stapled onto the crura using a 12-mm hernia gun (Autosuture, U.S. Surgical, Corporation, Norwalk, CT, USA).

Subsequently, in 37 patients, the crural defect was repaired by direct interrupted suture (group S) using 0 Ethibond (Ethicon). If posterior closure could not be completed, anterior sutures were placed to avoid excessive tension of the crural repair. Tightness of the repair was assessed by use of a 56-Fr Maloney esophageal bougie. In two patients repair of the hiatus was impossible. These patients underwent gastropexy alone (group G).

Initially, fundoplication was undertaken only when there was evidence of reflux. Since 1998, fundoplication has been used routinely. Patients with mesh repair underwent a 180° anterior fundoplication. When a concomitant fundoplication was undertaken in group S, the mobility of the fundus was assessed and, if necessary, short gastric vessels were divided either by use of a harmonic scalpel (Ethicon) or, in early cases in the series, by division between hemostatic clips. If the fundus was mobile, a floppy 360° Nissen fundoplication was performed. In other cases, a 270° Toupet or 180° anterior wrap appeared to lie more comfortably, without undue tension.

All patients underwent gastropexy at two port sites. Fixation was performed by withdrawing a portion of the anterior wall of the stomach through the epigastric and left upper quadrant port incisions using endo-Babcock forceps. Pneumoperitoneum was evacuated and the stomach was then sutured to the abdominal wall muscle by tying externally (1.0 J Ethibond, Ethicon).

Postoperatively, nasogastric intubation was not used. Patients were allowed free fluids and a light diet from day 1, as tolerated. Patients were discharged when ambulant and capable of self-care.

Results

Since 1993, we have performed more than 360 laparoscopic antireflux procedures. During the same period, an additional 53 patients with large POHs were treated. All operations were performed or supervised by one surgeon. Nine patients had endoscopy-proven esophagitis. Following barium meal, 24 were classified as pure rolling hiatus hernias (type II) and 29 as mixed hernias (type III). Two hernias included the small and large bowels.

All 53 had more than 50% of the stomach within the posterior mediastinum on barium swallow.

Operation details are shown in Table 2. The mean operating time was 129 min (range, 65–210). Twenty-three patients had sutured posterior hiatal repair, two had an anterior repair, and 12 patients underwent both anterior and posterior repair. In 12 patients, the hernial sac was treated by circumcision alone. The remaining 41 patients were treated with complete sac excision. Fundoplication was performed in nine of 14 patients in group M (180° anterior). Twenty-four of the group S patients had a fundoplication (16 Nissen, six Toupet, and two 180° anterior). Four laparoscopic procedures were converted to open surgery, one because of dense adhesions following a previous colectomy, one because of an intraoperative esophageal perforation, one because of brisk hemorrhage from an omental vessel, and one because of a densely adherent omentum obstructing the hiatal defect. All four patients underwent suture repair and have been included in group S. The esophageal perforation was identified immediately and repaired primarily with no subsequent leak. In another patient in group S, an esophageal perforation was identified at operation and repaired successfully laparoscopically.

Postoperative details are shown in Table 2. There was a single mortality (2%). A 72-year-old woman with a total intrathoracic stomach and large crural defect was treated with sac excision, suture repair, 360° fundoplication, and gastropexy. Postoperatively, the patient sustained a gastric perforation requiring laparotomy. She developed a gastropleural fistula and, despite both conservative and operative management of the fistula, died 75 days after surgery. Postoperative complications occurred in six patients. One patient developed left ventricular failure and arrhythmia, two developed a chest infection, and two developed urinary retention. One patient who underwent a 360° fundoplication developed postoperative dysphagia that responded well to dilatation. This represents an overall postoperative morbidity of 13%.

Median hospital stay was 2 days (range, 1–75). The median time to return to normal activity was 14 days (range, 2–37). Mean follow-up was 46 months (range, 18–89) for group M, 15 months (range, 6–52) for group S, and 6 months for group G. Results of Visick grading at 6 weeks and at long-term follow-up are shown in Table 2. New symptoms of gastroesophageal reflux were noted postoperatively in five patients in group M, four

Table 2. Operative and postoperative details of patients undergoing laparoscopic surgery for paraesophageal hernia

	Group M (n = 14)	Group S (n = 37)	Group G (n = 2)
Operation time (min)[a]	109 (65–152)	139 (72–210)	90, 134
Fundoplication			
Anterior 180°	9	2	0
Posterior 270°	0	6	0
Posterior 360°	0	16	0
Major complications	3 (21%)	3 (8%)	0
Hospital stay (days)[b]	2 (1–7)	2 (1–75)	4–14
Return to normal activity (days)[b]	14 (2–35)	14 (2–42)	35
Visick grade I/II/III/IV (at 6 weeks)	11/2/1/0	23/11/1/1	0/0/0/2
Visick grade I/II/III/IV (long term)	10/3/1/0	20/12/1/0	0/0/0/1
Proven recurrence	2 (14%)	1 (3%)	2 (100%)
Postoperative PPI (daily)	1 (7%)	4 (8%)	0

Group M, mesh repair; group S, sutured repair; group G, gastropexy alone; PPI, proton pump inhibitor
[a] Mean value (range)
[b] Median value (range)

in group S, and one in group G (36, 11, and 50%, respectively). Postoperative reflux was seen in five patients who had a fundoplication (15%) and five patients who did not have a fundoplication (25%).

Symptomatic hernia recurrence occurred in two patients in group M (14%) at 6 weeks and 15 months, respectively. Both were confirmed on barium swallow. The first patient has since had an open repair with good result, and the second refused further surgery. A small sliding hernia was recorded on barium swallow in one patient (3%) in group S 3 weeks postoperatively following a severe bout of gastroenteritis. The patient has since undergone successful repair by open surgery. Recurrence occurred in both patients in group G (100%) on days 2 and 7 after operation. One underwent open revisional surgery within 24 h and the other declined further surgery. Overall, symptomatic recurrence of POHs occurred in two patients in whom the sac was left in situ (17%) and three patients in whom the sac was excised (7%). The final 21 patients have undergone excision of the hernial sac, suture repair of the hiatus, and fundoplication. Of these, no patients have had barium-proven recurrence.

At long-term follow-up, 41 patients were very satisfied with their operation, eight were quite satisfied, and three not satisfied with their outcome. Two of the patients not satisfied have had symptomatic hernia recurrence, and the other patient has had bad reflux following an open procedure. A fundoplication was not carried out on this patient.

Discussion

The presented postoperative morbidity rate (13%) compares favorably with other reported complication rates of 13.5–50% [3, 9, 13]. It is difficult to make direct comparison because some units report all complications and others report major complications only. Death from laparoscopic POH repair has been reported in other series [1, 4, 6, 14, 15, 19, 20]. The largest series by Terry et al. [15] reported three deaths among 118 POH repairs.

Reflux symptoms occurred in 19% of patients postoperatively. These results compare favorably with reported recurrent reflux rates after operation of 8–42% [2,

9, 11]. The current study could be interpreted to favor fundoplication as part of POH repair. We now routinely undertake fundoplication in the treatment of POH. The type of fundoplication is probably of little consequence since studies have shown no functional difference between 360°, 270°, and anterior fundoplications [10, 18]. In the current series, local anatomical factors rather than considerations such as postoperative dysphagia dictated the type of fundoplication chosen.

Reports of experience in open surgery for POH include abdominal and thoracic approaches, with mortality and morbidity figures similar to those for laparoscopic surgery [7, 12]. The only study to directly compare laparoscopic with open repair of POHs identified a much higher postoperative complication rate in the open repair group [14]. Like all reports of POHs, this was an observational study without randomization, but the results remain important.

The presented results confirm that laparoscopic repair of POHs can be performed safely without excessive morbidity or mortality by laparoscopic surgery in a group of predominantly elderly patients. The general benefits of laparoscopic surgery, with short hospital stay and early return to normality [14], are reaffirmed by our results.

The aim of the current study was not to compare different operative approaches. Instead, it represents a longitudinal experience of laparoscopic surgery for this condition in a single unit. A number of uncertainties still pertain to surgery for paraesophageal hernia, resulting in didactically held views: whether to excise the hernial sac, how to close the hernial defect, and whether to perform concomitant antireflux surgery.

Some surgeons believe that the hernial sac must be excised to reduce the risk of hernia recurrence [16]. The hernia recurrence rate was lower in the group following sac excision (8 vs 17%), but this difference was not significant. Disadvantages of sac excision include pleural tears, mediastinal hemorrhage, and vagal nerve injury: none of these were encountered in our series. Despite lack of good evidence, we perform complete sac excision as an integral part of POH repair.

The size of hiatal defect may be considerable. The position of sutures used to close the defect is probably not important [17]. In certain cases, laparoscopic suture

closure of a large defect may be impossible no matter whether the sutures are placed posteriorly, anteriorly, or in combination. Primary suture of weak, attenuated tissue could lead to ischemic necrosis and subsequent failure of the repair.

Stapling prosthetic mesh across the hiatal defect effects closure of the hiatus in a tension-free manner, akin to the principle of mesh repair of inguinal hernia. Mesh repair has been used successfully for treatment of POHs [8]. In the presented series of stapled mesh repair, with a follow-up of more than 5 years, neither adhesion obstruction nor esophageal erosion have been encountered and these results show this method to be acceptable. The change in technique from stapled mesh to suture repair was made due to adverse criticism and the potential for esophageal erosion in patients undergoing mesh repair [5].

Suture repair is technically more demanding and it took slightly longer to perform than stapled mesh repair (Table 2). It also requires complete dissection of the crura posterior to the esophagus, which may add to the operative time. Agwunobi et al. [1] achieved good results without hiatal closure but with simple gastropexy alone. In group G, gastropexy alone was followed by early recurrent herniation. We believe that hiatal closure remains a principle of the operation and we no longer recommend gastropexy alone except in the very infirm.

Reported symptom recurrence rates vary from 4 to 20% [1, 6], in keeping with our symptomatic and barium meal proven recurrence rate of 9%. Of the four patients in whom early recurrence occurred, all noticed immediate return of their preoperative symptoms. We accept that not all patients had barium follow-up and therefore our true recurrence rate is likely to be higher. The clinical relevance of a small, asymptomatic, barium proven recurrence remains uncertain. Reports of elective barium swallow following POH repair have identified recurrent herniation in 7–23% of patients [19, 20].

As a result of the presented experience with laparoscopic repair of POHs, we advocate the following procedure, excision of the hernial sac, closure of the hiatal defect, a fundoplication, and a gastropexy. Irrespective of age, massive crural defects in patients with severely attenuated crura may be safely closed by stapled mesh repair. When the crural defect is moderate (the majority) and crural muscle fibers remain, a sutured repair may be employed. Simple reduction and gastropexy can no longer be advocated.

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